

### REMARKS

Claims 1, 3-7, 9-15, and 17-28 are pending, with claims 1, 7, 15, and 21 being independent. Claims 1, 7, 15, and 21 have been amended, claims 8 and 16 have been canceled<sup>1</sup>, and claims 22-28 have been added. Support for the amendments and the new claims can be found in the originally-filed specification, at least at page 2, line 4 to page 3, line 19; page 5, line 11 to page 8, line 17; page 10; line 15 to page 11, line 4; and Figs. 1A-5. No new matter has been added.

#### **Claims 7, 9, 10, 12, 13, 15, 17, 18, and 20**

Independent claim 7 recites a metal bond joint for use with hollow articles formed from metal shells. The bond joint includes a pair of opposed flanges in contact with one another, and a diffusion bond between the pair of opposed flanges. Each of the opposed flanges is disposed at the periphery of one of the metal shells, and the flanges are aligned with one another and define a bond region where they are in contact with one another. The opposed flanges are shaped such that a gap is formed in an area between the shells and at a region where the shells would abut so as to prevent the bond region from extending into the abutting shell region. The diffusion bond is formed across the entire bond region.

Independent claim 15 recites a hollow metal article including a pair of opposed metal shells, and a metal bond joint as recited in claim 7.

Claims 7, 9, 10, 12, 13, 15, 17, 18, and 20 have been rejected as being anticipated by U.S. Patent No. 3,980,220 (Wolfe). Applicant requests withdrawal of this rejection because Wolfe fails to describe or suggest a diffusion bond formed across an entire bond region that is defined where opposed flanges are in contact with one another but does not extend into a region where the metal shells would abut, as recited in claims 7 and 15.

Wolfe relates to a method for welding ring sections 10, 12 together. See Wolfe at col. 2, lines 56-59; col. 3, lines 13-17; and Fig. 1. Wolfe's method includes mating the ring sections 10,

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<sup>1</sup> Claim 2 was previously canceled.

12 together at respective flanges 14, 16, applying heat at the joint between the ring sections 10, 12 at the flanges 14, 16 while applying pressure to the ring sections 10, 12. See Wolfe at col. 1, line 51 to col. 2, line 24; col. 3, lines 13-27 and Fig. 2. However, Wolfe fails to show that the diffusion bond does not extend into a region where the ring sections 10, 12 would abut. In contrast and thus teaching away from such configuration, Wolfe indicates that the flanges 14, 16 extend through the region where the ring sections 10, 12 abut such that the joint at the abutting region is part of the bond region. See Wolfe at col. 3, lines 35-50 and Fig. 2. Moreover, one of ordinary skill in the art would not have been motivated to modify Wolfe in a manner in which the bond region did not extend into the region where the ring sections 10, 12 abut because any such modification would require a redesign of Wolfe's flanges 14, 16 and the ring sections 10, 12 at the abutting region.

For at least these reasons, claims 7 and 15 are allowable over Wolfe. Claims 9, 10, 12, 13, 17, 18, and 20 depend from claims 7 or 15, and are allowable for at least the reasons that claims 7 and 15 are allowable.

**Claims 1, 3-6, 11, 14, 19, and 21**

Claims 1, 3-6, 11, 14, 19, and 21 have been rejected as being obvious over Wolfe in view of U.S. Patent No. 3,964,667 (Anderson). Applicant requests withdrawal of this rejection for the following reasons.

Independent claim 1 recites a method of bonding metal shells to form a vessel having an interior void. The method includes forming each of the metal shells with a peripheral flange, aligning the metal shells with one another such that their respective peripheral flanges are engaged with one another, assembling the aligned metal shells with tooling to engage the flanges, and applying compression force to the flanges, via the tooling, at an elevated temperature so as to form a diffusion bond joint where the flanges meet. The region where the flanges engage one another defines a bond region, and the compression force is applied broadly across the flanges so as to cover at least the bond region. Applicant requests withdrawal of this rejection because neither Wolfe nor Anderson describes or suggests applying a compression

force to peripheral flanges of metal shells via a tooling so as to form a diffusion bond joint where the flanges meet, and because one of ordinary skill in the art would not have been motivated to modify Wolfe using the teachings of Anderson to provide such compression.

Wolfe's method does not include use of a tooling to apply a compression force. Rather, Wolfe explains that the pressure applied to the ring sections 10, 12 is from a vacuum formed within a cavity of the ring sections 10, 12. See Wolfe at col. 3, lines 35-46 and Fig. 2. Thus, Wolfe does not describe or suggest applying a compression force to the flanges 14, 16 via a tooling to form a diffusion bond.

Anderson fails to remedy the failure of Wolfe to describe or suggest application of such a compression force. Anderson relates to a bond that is formed between beryllium pieces. See Anderson at col. 3, line 21 to col. 5, line 23. Anderson explains that the force can be applied "through suitable fixtures to the beryllium pieces to maintain the latter in an abutting relationship." See Anderson at col. 3, lines 35-40. However, Anderson never suggests that such fixtures are used to apply a compression force to peripheral flanges formed on each of the pieces. Moreover, one of ordinary skill in the art would not have been motivated to modify Wolfe with the fixtures of Anderson because any such modification would change the principle of operation of Wolfe, which uses vacuum pressure to apply forces to the ring sections 10, 12.

For at least these reasons, any possible combination of Wolfe and Anderson would still fail to describe or suggest the features of claim 1. Accordingly, claim 1 is allowable over Wolfe and Anderson. Claims 3-6, 11, 14, and 19 depend from claim 1, and are allowable for at least the reasons that claim 1 is allowable.

Independent claim 21 recites a homogenous bond joint for use with hollow beryllium articles formed from beryllium shells. The bond joint includes a pair of opposed beryllium flanges in contact with one another, and a diffusion bond between the pair of opposed flanges. Each of the opposed flanges is disposed at the periphery of one of the beryllium shells, the flanges are aligned with one another and define a bond region where they are in contact with one another. The diffusion bond is formed across the entire bond region. The flanges are shaped such that a gap is formed in an area between the shells and at a region where the shells would

abut so as to prevent the bond region from extending into the abutting shell region. The diffusion bond is formed by applying compression force to the flanges at an elevated temperature. Applicant requests withdrawal of the rejection of claim 21 because, neither Wolfe nor Anderson describes or suggests a diffusion bond formed across an entire bond region that is defined where opposed flanges are in contact with one another but does not extend into a region where the metal shells would abut, as recited in claim 21.

As discussed above, Wolfe is void of such a diffusion bond. Moreover, Anderson does not remedy the failure of Wolfe to describe or suggest such a diffusion bond. In Anderson, there is no suggestion that the bond is formed across a bond region that is defined where opposed flanges are in contact with one another. Rather, Anderson explains that the bond is formed "between the beryllium pieces" with no suggestion that a flange is used to form the bond. For at least these reasons, claim 21 is allowable over any possible combination of Wolfe and Anderson.

#### **Claims 22-28**

Claims 22-28 depend from claim 1, and are allowable for at least the reasons that claim 1 is allowable, and for containing allowable subject matter in their own right. For example, claim 23 recites that the method also includes stopping the compression when a deformation size reaches a predetermined value. However, neither Wolfe nor Anderson describes or suggests such a step. As a further example, claim 26 recites that the metal shells and the tooling are placed into a sealed can prior to application of the compression force, and applying the compression force includes pressurizing the can. Neither Wolfe nor Anderson describes or suggests such a sealed can. As another example, claim 28 recites that application of the compression force is done without applying compression force to side walls of the metal shells from which the peripheral flanges extend. Neither Wolfe nor Anderson describes or suggests such a compression.

In conclusion, applicant requests allowance of all claims.

Applicant : Charles J. Stouffer et al  
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The fee in the amount of \$650 in payment of the two-month extension of time fee (\$450) and the excess claim fees (\$200) is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

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/Diana DiBerardino/

Diana DiBerardino  
Reg. No. 45,653

Fish & Richardson P.C.  
1425 K Street, N.W.  
11th Floor  
Washington, DC 20005-3500  
Telephone: (202) 783-5070  
Facsimile: (202) 783-2331